Minnesota's Ethanol Experience

What we know,

-A 10% ethanol blend has 3.5% oxygen.

-More oxygen than any other oxygenate.

-Ethanol helped MN. achieve compliance for federeral CO standard in 1999.

Minnesota's Ethanol Experience

- -Many allegations occurred in ethanol debate including.
  - -ethanol might increase NOx
  - -therefore ethanol might increase Ozone
  - -ethanol increases evaporative emissions therefore, it pollutes more than gasoline

Minnesota's Ethanol Experience

- MN Pollution Control Agency published a report on ozone formation in June 30, 1994.
- Report concluded little or no impact would result from the use of ethanol in conventional gasoline in Minnesota.
- A similar study was done for the Chicago area for reformulated gasoline.

Minnesota's Ethanol Experience

- Debate has raged on in MN and other states.
- Arguments I hear in other states are similar to those we heard here.

Minnesota's Ethanol Experience

- California and other states tried to convince EPA that ethanol would cause more ozone in RFG.
- EPA denied request because of lack of evidence.

Minnesota's Ethanol Experience

- Fundamental issues discovered.
  - PM 2.5 seems to decrease with ethanol.
  - Ethanol is most effective in reducing CO.
  - Toxic emissions are reduced through dilution, cleaner burning, and replacement of octane components.

Minnesota's Ethanol Experience

Fundamental Issues (continued)

- CO is increasingly a more important pollutant in the development of ozone. (smog)
- Evaporative emissions are offset by decreases in exhaust emissions.
- Reactivity of "evaps" are less than exhaust.
- Recent studies indicate NOx increase from oxygenate use is not a given.

Minnesota's Ethanol Experience

- After 15 years of debate in Minnesota and around the country:
  - Opponents still say ethanol might increase ozone.
  - Not even large state initiatives are able to document any increase in ozone.
  - Predictions of higher cost, wide spread damage, supply disruption, increased pollution have not come to pass.

Minnesota's Ethanol Experience

- After 15 years of debate in Minnesota and around the country:
  - USDA says ethanol energy yield is 1.67 Btu of energy / BTU of fossil energy used.
  - Compares to gasoline energy yield of 0.8Btu
  - Legislators have listened to ozone debate and concluded that the debate may never be resolved.
  - In the mean time they are pushing for clean, domestic, renewable fuels like ethanol, biodiesel and wind generated electricity.

Minnesota's Ethanol Experience

- Documentation:
  - "Ozone Impact of Year-Round Oxy-Fuel Program in Minnesota." MN Pollutrion Control Agency
  - "Air Quality and Ethanol in Gasoline"
    - Whitten
  - "The 2001 net Energy Balance of Corn Ethanol." USDA